III-V COMPOUND SEMICONDUCTOR DEVICE

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Abstract

PURPOSE:To make it possible to realize a negative resistance without having a lattice mismatching at all by a method wherein a donor and an acceptor are doped alternately to a resonance tunnel diode formed on a III-V compound semiconductor substrate in a thin sheet form and the total amount of the charge of a donor sheet and the total amount of the charge of an acceptor sheet are made equal to each other.

CONSTITUTION:An n<+>-GaAs layer is grown on a GaAs substrate, the growth is changed into that of an ALE(atomic layer epitaxy) mode, a H2Se is fed to the surface of As to perform a donor sheet doping and an n-type GaAs layer is grown. Then, 15 undoped GaAs molecular layers are grown and after a GaAs layer is formed, the growth is stopped on the surface of a Ga layer to perform an acceptor sheet doping and after 15 molecular layers of undoped GaAs are grown, a donor sheet doping is performed in order. These dopings are repeated to grow a donor sheet and an acceptor sheet at an interval and after the total amount of the charge of the donor sheet and the total amount of the charge of the acceptor sheet are made equal to each other, the n<+> GaAs layer is grown. Thereby, a negative resistance can be obtained in a state that there is no lattice mismatching on the III-V compound semiconductor substrate.